REMARKS

Reconsideration and withdrawal of the rejection and the allowance of all claims now pending in the above-identified patent application (i.e., Claims 38, 40-51 and 53-63) are respectfully requested in view of the foregoing amendments and the following remarks.

At the outset, it should be recognized that the present invention provides a modular barrier comprising a plurality of barrier sections having male and female ends. The female end of a first barrier section interacts with the male end of an additional barrier section, so that projection(s) provided at the female end of one barrier section mate with one or more projections provided at the male end of the additional barrier. The mating of the projections at the male and female ends enable the barrier sections to securely connect with each other. A hinge pin can be used to supply extra security for preventing the barrier sections from separating in the event of a collusion or impact with the barrier.

The claimed modular barrier further comprises a nose at the female end and a cavity at the male end, which corresponds to the nose. The nose has a surface of rotation, which is a surface of the profile of the comparatively wide base portion of the barrier (as best illustrated in FIGS. 1 and 2), which corresponds to the surface of the cavity of an additional barrier, so that the nose and cavity fit together

without any gap between them.

The shaped external surfaces of the nose and cavity are shaped for conforming to one another, so that when the nose of the additional barrier section is accommodated in the cavity, substantially all of the concavely shaped external surface of the cavity is juxtaposed with the convexly shaped external surface of said nose in any permitted angular orientation of the barrier sections for preventing any gap between the comparatively wide base portion of the barrier section and a comparatively wide base portion of the additional barrier section. This feature differs from any analogous surfaces of rotation found in the applied prior art of Striefel et al., U.S. Patent No. 6,059,491, which lack concavely-shaped external surfaces for forming the connection between adjacent barrier segments.

More particularly, the presently claimed invention comprises a nose portion, which is a surface of rotation of the wide base portion, and a cavity, which is also a surface of rotation of the wide base portion. Thus, if a two-dimensional curve is taken of the profile of the base portion and rotated about an axis, the resultant nose and cavity portions take the shape as described above.

As a result of the nose and cavity being surfaces of rotation of the profile of the wide base portion, the nose and cavity are of substantially the same cross-sectional

width as the wide base portion (as now recited in new Claims 62 and 63) and, therefore, offer a smooth "junction" between barrier sections, thus providing greater stability for the modular barrier. None of the prior art is submitted to disclose such nose portions and cavities.

The nose and cavity portions being surfaces of rotation also provide the advantage of there being no gaps or openings formed between adjacent barrier sections, thus preventing "wheel trap" between barrier sections. The phrase "no gaps" is not necessarily restricted to lateral openings, *i.e.*, "holes" between one side of the barrier sections and the other side. Gaps may also be present between adjacent barrier sections if, when looking downward from above on the barrier sections, there is space between the two adjacent wide base portions.

The present invention has no gaps between the wide base portions when looking downwardly onto the barrier and, thus, a smooth barrier is formed. In contrast, the prior art, although comparable devices may not have gaps between one side of the barrier section and the other side, may still have gaps between adjacent wide base portions, due to the narrow nature of the joining regions. Consequently, it is possible, in the case of prior art barrier systems, that the wheels of vehicles could become trapped between the wide base portions of adjacent barriers.

As will be explained in greater detail hereinafter, nowhere in the prior art is such a novel and efficient modular barrier, useful for traffic and crowd control, either disclosed or suggested.

By the present amendments, Applicant has amended independent Claims 38 and 47 to recite the feature of the nose and cavity being "a surface of rotation of a profile" of the base portion. (Dependent Claims 39 and 52, respectively, have been cancelled in view of the amendments entered to Claims 38 and 47.)

Applicant has also added Claims 60-63, which are each dependent upon independent Claim 38, to further define the amendments now entered to Claim 38. The subject matter of Claims 60 and 61 recites features mathematically inherent in the concept of a "surface of rotation," which is further described in the attachments hereto obtained from the following websites:

(1) http://mathworld.wolfram.com/SurfacesofRevolution.html

(2) http://www.mathwords.com/s/surface_of_revolution.htm

(3) http://www.cs.mtu.edu/~shene/COURSES/cs3621/LAB/surface/rev-surf.html

New dependent Claims 62 and 63 recite that the nose and cavity are of substantially equal width as the wide base portion, which is submitted to be evident from the drawing figures of the instant patent application.

Finally, Applicant has also amended dependent Claims 41, 42, 54 and 55 to delete the word "substantially," so that the phrase "substantially part-cylindrical" (which Applicant can agree eludes precise understanding) is amended to now read --part-cylindrical--. The Examiner has objected to the enumerated claims because the phrase "substantially part-cylindrical" was not defined in the Specification.

The amendments entered to Claims 41, 42, 54 and 55 are submitted to overcome the Examiner's objection and, consequently, withdrawal of the objection to such claims is respectfully requested.

There now being a total of twenty-four (24) claims pending in the instant patent application (two more claims than covered by the original filing fee and previously paid additional claims fee remitted on April 20, 2004), Applicant remits the further additional claims fee of $36.00 (large entity) to cover all claims pending at this time.

Turning now, in detail, to an analysis of the Examiner's prior art rejection, in the fifth Office Action the Examiner has rejected Claims 38-44, 46, 47, 51-57 and 59 (Claims 38 and 47 being the two independent claims pending in the application) as being obvious, pursuant to 35 U.S.C. §103(a), over Striefel et al., U.S. Patent No. 6,059,491, taken in view of Wasserstrom, U.S. Patent No. 5,988,934. It is the Examiner's contention that Striefel et al. discloses a barrier article

comprising at least one barrier section having a comparatively narrow upright portion (26), and having one or more corresponding projections (60, 62) and recesses (61, 63), such that each end of the barrier has an equal number of projections and recess. Striefel et al., according to the Examiner, further includes a comparatively wide base portion (24), a nose (60), defining a convexly-curved external surface projecting from the comparatively wide base portion at a first end of the barrier, along with a cavity defining an external surface formed in the comparatively wide base portion at a second end of the barrier, with at least one hinge pin (64) that can be passed between the barrier section and an additional barrier section. The nose and cavity of the Striefel et al. barrier have external surfaces, so that the nose is accommodated in the cavity and, according to the Examiner, positionable in any permitted angular orientation of the barrier section.

The Examiner has acknowledged that the primary reference of Striefel et al. fails to disclose utilizing matching convex and concave surfaces of the projections and recesses. The Examiner has, therefore, secondarily-applied Wasserstrom for its contended disclosure of a barrier system of interconnected barriers having narrow top portions (12) and wider base portions (14), with the barriers being interconnected by at least one convex projection (38) and one concave recess (46).

The Examiner has, therefore, concluded that it would have been obvious to have provided the barrier system of Striefel et al. with concavely-shaped recesses that correspond to that of a protrusion, as taught by Wasserstrom, in order to facilitate a more efficient connection of adjacent road barriers, as Applicant is now claiming. (The remaining dependent claims pending in the application were rejected as being obvious over Striefel et al., taken in view of Wasserstrom, with or without the application of further prior art.)

In reply to the Examiner's principal obviousness rejection applying Striefel et al., taken in view of Wasserstrom, Applicant respectfully submits that numerous differences exist between the primary reference of Striefel et al., and that claimed by Applicant. Among the differences is that the projections (60, 62) in Striefel et al. cannot properly be considered "surfaces of rotation" of the wide base portion, as defined mathematically and further explained in the attachments to this Response. If a two-dimensional curve of the profile of the comparatively wide base portion of Striefel et al. was taken, it would not provide a nose as indicated by projection (60). Instead, the result would be a projection which had the same width as the base portion and would include a wide and flat part-cylindrical "lip" region, which corresponds to the "stabilizing toe 40." Thus, projection (60) is clearly not a surface of rotation of the wide base portion. It is respectfully contended to not even be a

"surface of rotation" of the narrow upright portion.

Further, it is respectfully submitted that there is no disclosure or suggestion in Striefel et al. for the provision of a nose portion or a cavity portion, which are surfaces of rotation of the profile of the base portion. It is contended to be counterintuitive for Striefel et al. to suggest nose and cavity portions, as is the case with the presently claimed invention, since Striefel et al. discloses that narrower projections are required for the barrier sections to articulate relative to one another. The provision of "a pair of opposed upright endwall portions 70, 72 extend laterally therefrom perpendicular to central plane 56" (Striefel et al., Col. 3, lines 44-46) indicates that the projections must be narrower than the main body of the barrier sections. This is respectfully contended to be a structural distinction from that which is now being claimed by Applicant.

The provision of nose and cavity portions, which are surfaces of rotation, negate the need for such narrow "hinge regions" between barrier sections. As a result, the barrier section presently disclosed and claimed by Applicant has greater stability than the barrier section disclosed by Striefel et al. (In Applicant's invention, the barrier section does <u>not</u> contain a cavity in the comparatively wide base portion; the Examiner's understanding on this point is submitted to not be accurate.)

Wasserstrom, the secondarily-applied citation, it is respectfully contended, also fails to disclose or suggest a nose which is a surface of rotation of the profile of the base portion. As illustrated in FIG. 1 of Wasserstrom, the barrier section therein does not comprise separate nose portions and projections, as is the case with the presently claimed invention. Wasserstrom, instead, has a single projection (38), which extends the full height of the barrier section. The projection terminates adjacent to the wide base portion in a locking pin (44). The provision of a single protrusion in Wasserstrom results in adjacent barrier sections being limited in the angle of orientation relative to each other (*see*, Wasserstrom, FIG. 9.) The present invention provides advantages over Wasserstrom, since the provision of the particular nose and cavity portions enables greater movement of adjacent barrier sections relative to one another in the case of the presently claimed invention.

Combining Striefel et al. and Wasserstrom in the manner suggested by the Examiner would not yield that which is now being claimed by Applicant, since neither prior art reference, considered separately or in combination, suggests the provision of a wide base portion, having a nose and a cavity, which are surfaces of rotation of the base profile. A combination of the prior art would, instead, result in a barrier section which has a narrow hinge region, either with a single or multiple protrusions, and recesses, each of which are nar-

rower than the wide base portion.

Both Striefel et al. and Wasserstrom teach that a narrow hinge is required to enable adjacent barrier sections to move relative to each other. The combination of Striefel et al. and Wasserstrom would, further, not yield a nose portion and cavity portion which are substantially of the same width as the wide base portion. This particular feature is due to the nose and cavity regions being surfaces of rotation of the profile of the wide base portion.

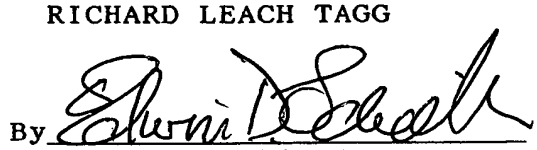
Consequently, Applicant respectfully contends that the Examiner's 35 U.S.C. §103(a) obviousness rejections, applying Striefel et al., taken in view of Wasserstrom, have been overcome and that the prior art rejections of the latest Office Action should now be appropriately withdrawn.

In view of the foregoing, it is respectfully contended that all claims now pending in the above-identified patent application (i.e., Claims 38, 40-51 and 53-63) recite a novel and safe modular barrier, comprised of barrier sections having complementary surfaces of rotation that are able to rotate relative to adjacent barrier sections without opening a gap between base portions of said barrier sections, which is patentably distinguishable over the prior art. Accordingly, withdrawal of the outstanding objection and rejections

and the allowance of all claims now pending are respectfully requested and earnestly solicited.

Respectfully submitted,

RICHARD LEACH TAGG

By 
Edwin D. Schindler
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November 22, 2004

Enc.: 1. Petition for Three-Month Extension of time;

2. Check for $1,016.00 (Three-Month Extension Fee ($980.00) + Additional Claims Fee ($36.00) (large entity));

3. "*Surfaces of Revolution*" http://mathworld.wolfram.-com/SurfacesofRevolution.html;

4. "*Surface of Revolution*" http://www.mathwords.com/-s/surface_of_revolution.htm; and,

5. "*Surfaces of Revolution*" http://www.cs.mtu.edu/-~shene/COURSES/cs3621/LAB/surface/rev-surf.html.

The Commissioner is hereby authorized to charge the Deposit Account of Applicant's Attorney, Account No. 19-0450, for any additional fees which may be due in connection with the prosecution of the present application, but which have not otherwise been provided for.

Surface of Revolution

A surface of revolution is a surface generated by rotating a two-dimensional curve about an axis. The resulting surface therefore always has azimuthal symmetry. Examples of surfaces of revolution include the apple, cone (excluding the base), conical frustum (excluding the ends), cylinder (excluding the ends), Darwin-de Sitter spheroid, Gabriel's horn, hyperboloid, lemon, oblate spheroid, paraboloid, prolate spheroid, pseudosphere, sphere, spheroid, and torus (and its generalization, the toroid).

The area element of the surface of revolution obtained by rotating the curve $y = f(x)$ from $x = a$ to $x = b$ about the x-axis is

$$dS = 2\pi y\, ds = 2\pi y\sqrt{1 + y'^2}\, dx, \tag{1}$$

so the surface area is

$$S = 2\pi \int_a^b f(x)\sqrt{1 + [f'(x)]^2}\, dx. \tag{2}$$

(Anton 1999, p. 380).

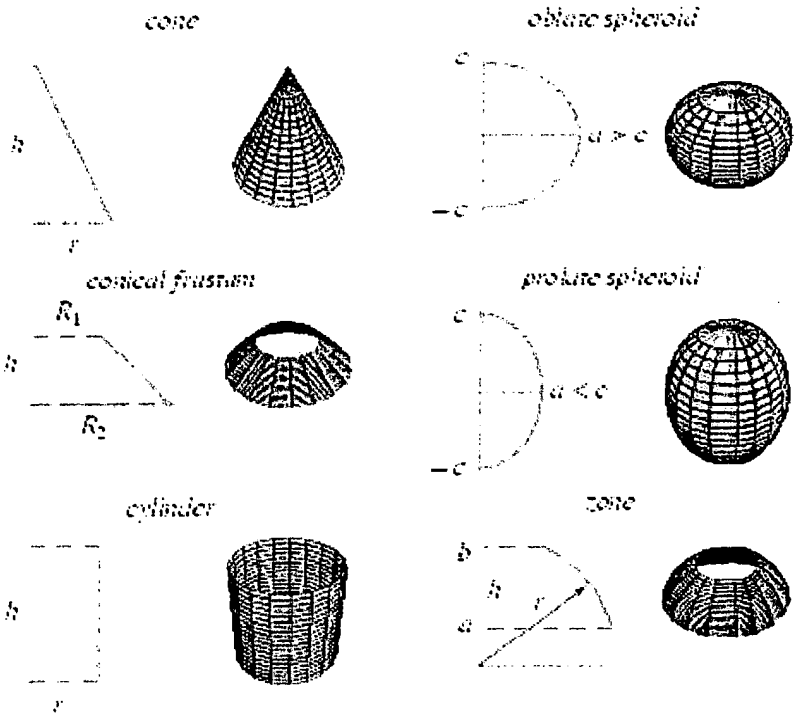
If we are interested instead in finding the area of the surface of revolution obtained by rotating the curve $x = g(y)$ around the y-axis from $y = a$ to $y = b$ (as opposed to rotating about the x-axis), the area element is given by

$$dS = 2\pi x\, ds = 2\pi x\sqrt{1 + x'^2}\, dy, \tag{3}$$

so the surface area is

$$S = 2\pi \int_a^b g(y)\sqrt{1 + [g'(y)]^2}\, dy \tag{4}$$

(Kaplan 1992, 3rd ed. p. 251; Anton 1999, p. 380).



The following table gives the lateral surface areas S for some common surfaces of revolution where r denotes the radius (of a cone, cylinder, sphere, or zone), R_1 and R_2 the inner and outer radii of a frustum, h the height, e the ellipticity of a spheroid, and a and c the equatorial and polar radii (for a spheroid) or the radius of a circular cross-section and rotational radius (for a torus).

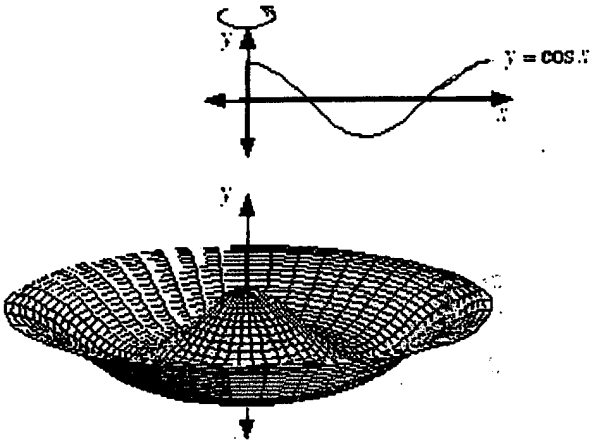
surface	S
cone	$\pi r\sqrt{r^2+h^2}$
conical frustum	$\pi(R_1+R_2)\sqrt{(R_1-R_2)^2+h^2}$
cylinder	$2\pi rh$
oblate spheroid	$2\pi a^2+\frac{\pi c^2}{e}\ln\left(\frac{1+e}{1-e}\right)$
prolate spheroid	$2\pi a^2+\frac{2\pi ac}{e}\sin^{-1}e$
sphere	$4\pi r^2$
torus	$4\pi^2 ac$
zone	$2\pi rh$

The standard parameterization of a surface of revolution is given by

(5)

Surface of Revolution

A surface that is obtained by rotating a plane curve in space about an axis coplanar to the curve.



This surface of revolution is obtained by revolving the graph of $y = \cos x$ about the y-axis.

See also

Solid of revolution, surface area of a surface of revolution

this page updated 21-jun-04

Surfaces of Revolution

A surface of revolution is generated by revolving a given curve about an axis. The given curve is a *profile curve* while the axis is the *axis of revolution*.

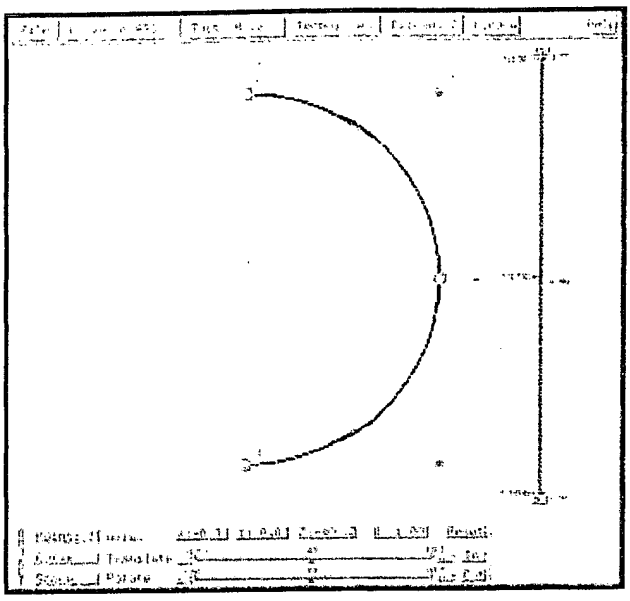
To design a surface of revolution, select **Advanced Features** followed by **Cross Sectional Design**. This will bring up the curve system. In the curve system, just design a profile curve based on the condition to be discussed below, and then select **Techniques** followed by **Generate Surface of Revolution**. The surface system will display a surface of revolution defined by the given profile curve.

Some special restrictions must be followed in order to design a surface of revolution under the curve system. First, the axis of revolution must be the z-axis. Second, the profile curve must be in the xz-plane. However, when brining up the curve system, only the xy-plane is shown. To overcome this problem, one can design a profile curve on the xy-plane and rotate the curve (not the scene) about the x-axis 90 degree (or -90 degree, depending on your need). In this way, the profile curve will be placed on the xz-plane. Note that to modify control points after this rotation, you must use the sliders.

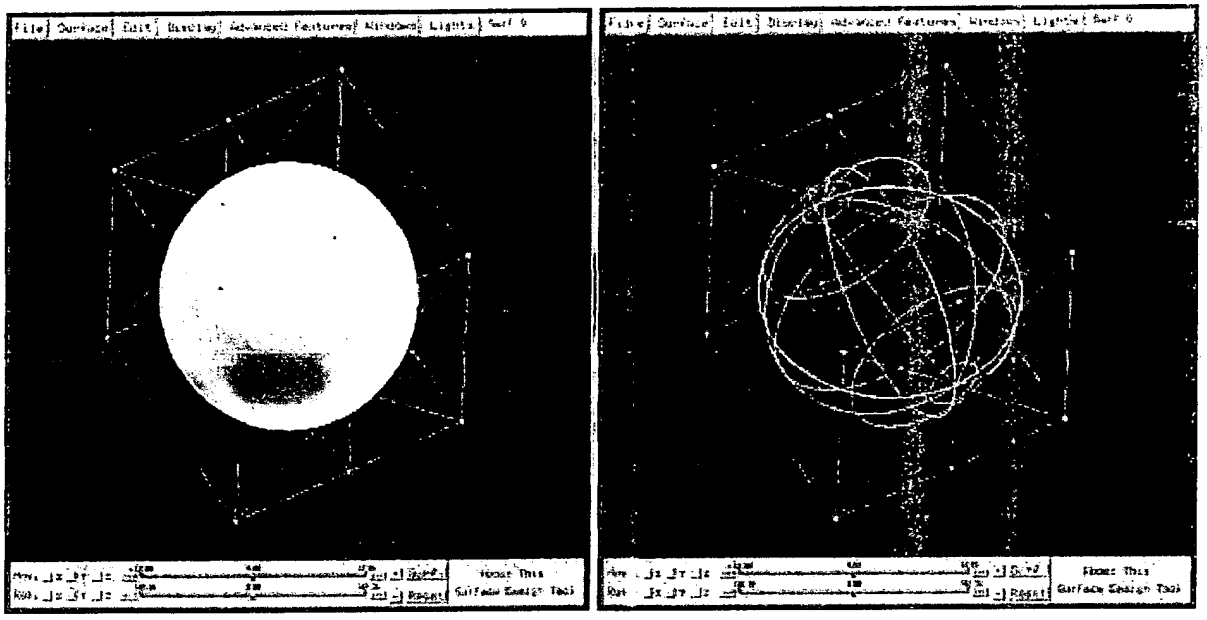
Many commonly seen and useful surfaces are surfaces of revolution (*e.g.*, spheres, cylinders, cones and tori). Here are a few examples.

Example 1: Sphere

Let us try the sphere first. A sphere is obtained by revolving a semi-circle about the axis of revolution. In the curve system, this semi-circle must be in the xz-plane and the axis of revolution must be the z-axis. The following semi-circle is a NURBS curve of degree 2. It has already been placed on the xz-plane so that its two endpoints are on the z-axis. Click here to download a copy of this file (**sphere.dat**) for your practice.

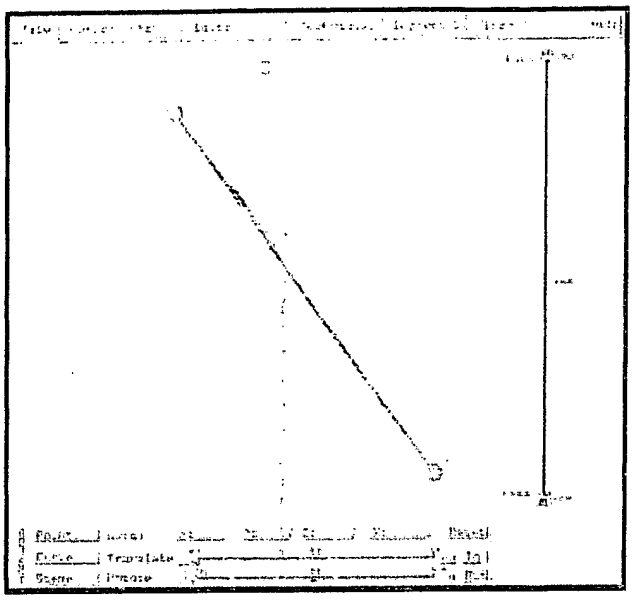


The following shows the generated sphere, shown in rendered patch and wireframe. The top center and bottom center control points correspond to the two end points of the semi-circle. Note also the circular wireframe lines which are the loci of points on the semi-circle.

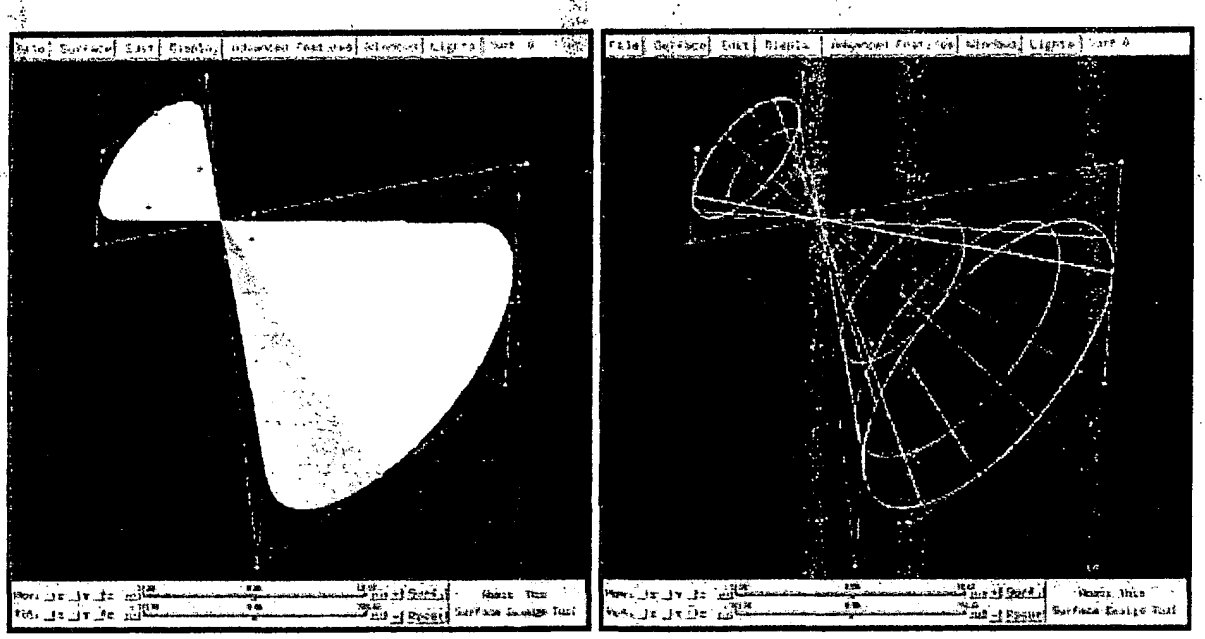


Example 2: Cone

A cone can also be generated as a surface of revolution. The profile curve is a line segment on a plane that contains the axis of revolution. The following figure shows a line segment that intersects the axis of revolution. Click here to download a copy of this file (cone.dat) for your practice.



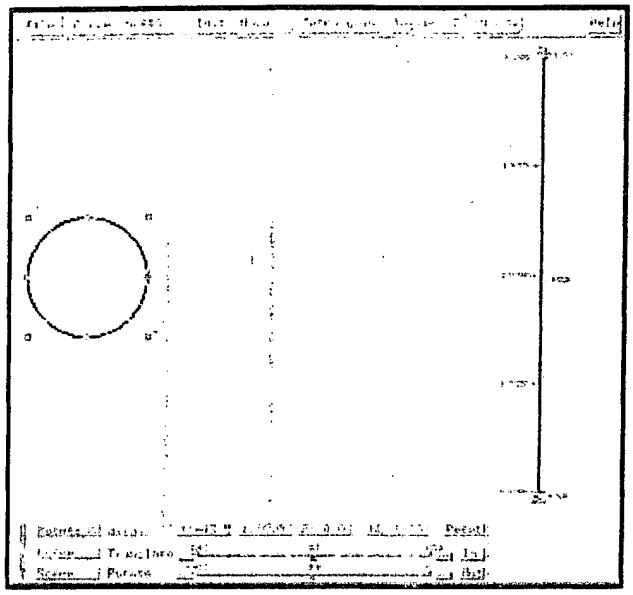
The following shows the generated cone, shown in rendered patch and wireframe. Note that the intersection point of the profile curve and the axis of revolution becomes the vertex (or apex) of the cone. Note also that the profile line segment does not have to intersect the axis of revolution. In this case, the cone's vertex (or apex) will disappear. You can move the line segment away from the z-axis and generate a new surface of revolution to see the effect.



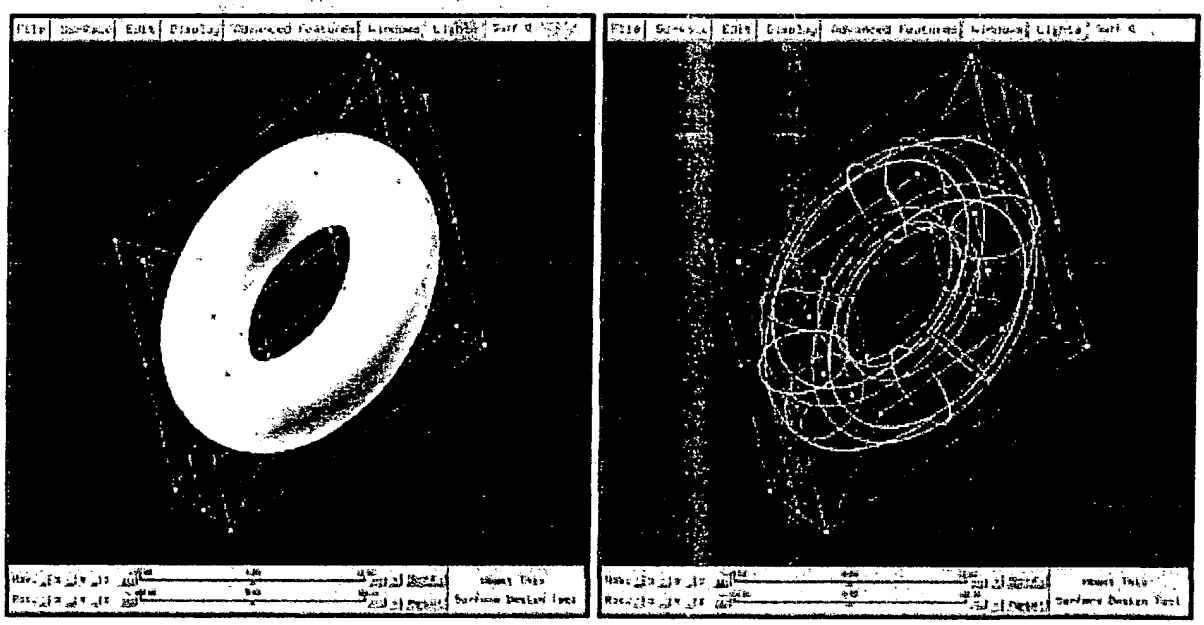
Example 3: Torus

The torus is another well-known surface of revolution and is generated by revolving a circle about an axis. The following figure shows a circle in the xz-plane. Click here to download a copy of this file

(**torus.dat**) for your practice



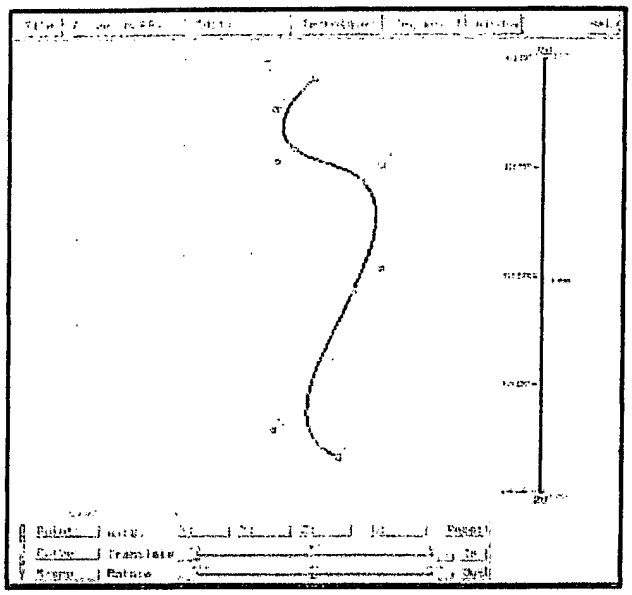
The following shows the generated torus. shown in rendered patch and wireframe. The input circle does not intersect the axis of revolution. If you move the circle so that it is tangent or intersect the axis of revolution, the generate torus will not look like a donuts. For the tangent (*resp.*, intersecting) case, the generate torus is referred to as a ***spindle torus*** with one (*resp.*, two) singularities.



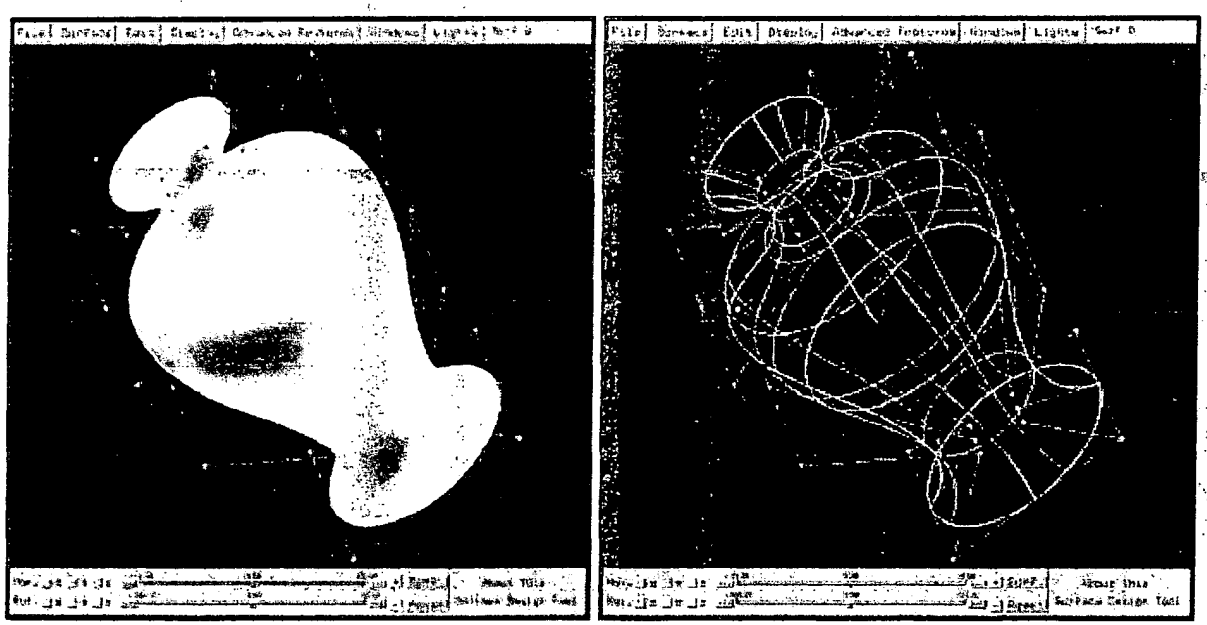
Example 4: Vase

Now, let us turn to some interesting surface design. Let us do a vase. First, design a profile curve which

looks like the profile of a vase, on the yz-plane and rotate it 90 degree to the xz-plane as shown below. This is a NURBS curve of degree 3. In general, degree three NURBS or even B-spline curves work well. Click here to download a copy of this file (vase.dat) for your practice.

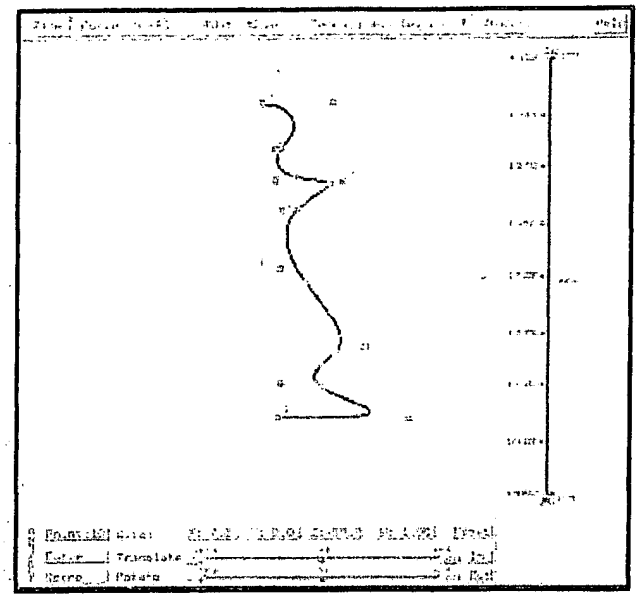


The generate vase-like surface is shown below in both rendered patch and wireframe forms.



Example 5: Chessman

Finally, let us do a chessman. We start with a NURBS curve of degree 3. Click here to download a copy of this file (chess.dat) for your practice.



The following shows the chessman-like surface in both rendered patch and wireframe form.